

## Practical acquisition of high-frequency, high-definition topographic data on riverbed morphology

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Measuring riverbed morphology material is useful crucial for proper appropriate river management and disaster prevention. For this, Highhigh-definition topographic data by SfM-MVS photogrammetry, UAV (Unmanned Aerial Vehicle) have become widely available, particularly using SfM-MVS (Structure-from-Motion Multi-View Stereo photogrammetry and UAV (Unmanned Aerial Vehicle)). This technology has the advantage of obtaining “high-resolution” that it can acquire terrain topographic data on the order of several cm orderentimeters. at “high-frequency” . In addition, since the researcher can acquire the topography information whenever he / she likes, there is also an advantage that it is possible to acquire data with “high-frequency” . However, since high resolution data is used, it is difficult to align data at many times. When the resolution of topographic datasets is high, accurate registration of multitemporal datasets is more critical than for coarser datasets. In this research, we aim to propose a problem solving method of extracting the difference with among multi-timeemporal topographic data and proposewith an appropriate resolution method infor the riverbed morphology measurement. By uUsing highly accurate-precision GNSS (Global Navigation Satellite System), the multitemporal topographic datasets obtained by UAV-SfM is georeferenced with an RMSE (Root Mean Squared Error) improves to about of several centimeters. However, although although these data resolution and accuracies are boasts sufficient resolution enough to grasp extract the morphology shape of individual riverbed gravels and to detect the volumetric change of the sediment mass, they are , it is insufficient to grasp trace its the movements of individual gravels. It is necessary to selecTo findt an appropriate resolution and registration accuracy according to the scale of the object to be detect ted. The gravel movements, were verified by we comparing assess the automatic and manual methods to extracted the shape of gravels from the topographic data. For example, to see the movement of gravel with a grain size of about 50 cm, an error of about 10<sup>0</sup> cm is required, and an error of about 50 cm is required to see the change of gravel sediment.

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